CLAIMS

What is claimed is:

1. A multi-layer optical filter arrangement having spatially and spectrally differential reflection characteristics and substantially uniform transmission characteristics over a band of at least 250 nm in the optical spectrum, said filter arrangement comprising:

(a) a substrate having a surface, the substrate being at least semi-transparent over the majority of the band;

(b) a first stack of optical thin films deposited on the surface of the substrate, the first stack comprising two metal layers and a dielectric layer interposed therebetween; and

(c) a second stack of optical thin films deposited on the surface of the substrate in a contiguous side by side relationship with the first stack, the second stack including two metal layers and a dielectric layer interposed therebetween, the two metal layers and dielectric layer of the second stack being extensions of the layers in the first stack, the second stack further including a second dielectric layer deposited thereon;

(d) wherein the first and second stacks reflect substantially different spectrums of light within the band from a reflecting side of the filter arrangement and the filter arrangement has substantially uniform transmission characteristics.

2. A multi-layer optical filter arrangement according to claim 1, wherein the band includes at least a portion of one of the following optical spectrums: the near UV spectrum, the visible spectrum, and the near infrared spectrum.

3. A multi-layer optical filter arrangement according to claim 1, wherein the band is between 480 nm and 630 nm.

4. A multi-layer optical filter arrangement according to claim 1 having spectrally differential reflection characteristics and substantially uniform transmission characteristics over a band of at least 300 nm in the optical spectrum.

5. A multi-layer optical filter arrangement according to claim 4, wherein the band is between 400 nm and 700 nm.

6. A multi-layer optical filter arrangement according to claim 1 in which the first stack further comprises a third dielectric layer deposited thereon, the third dielectric layer being of a different thickness than the second dielectric layer of the second stack.

7. A multi-layer optical filter arrangement according to claim 1 having a transmission of at least 40% of the incident light over a majority of the band.

8. A multi-layer optical filter arrangement according to claim 1 having a transmission of at least 20% of the incident light over a majority of the band.

9. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light transmitted through the first stack of the filter arrangement and the percentage of light transmitted through the second stack of the filter arrangement varies by less than or equal to 5% over the band.

10. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light transmitted through the first stack of the filter arrangement and the percentage of light transmitted through the second stack of the filter arrangement varies by less than or equal to 3% over the band.

11. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light transmitted through the first stack of the filter arrangement and the percentage of light transmitted through the second stack of the filter arrangement varies by less than or equal to 1% over the band.

12. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement from the reflecting side and the percentage of light reflected from the second stack of the filter arrangement from the reflecting side varies by more than 5% over a substantial portion of the band.

13. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement from the reflecting side and the percentage of light reflected from the second stack of the filter arrangement from the reflecting side varies by at least 10% over a substantial portion of the band.

14. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement from the reflecting side and the percentage of light reflected from the second stack of the filter

arrangement from the reflecting side varies by at least 25% over a substantial portion of the band.

15. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement and the percentage of light reflected from the second stack of the filter arrangement when measured from the side opposite the reflecting side varies by less than or equal to 5% over the band.

16. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement and the percentage of light reflected from the second stack of the filter arrangement when measured from the side opposite the reflecting side varies by less than or equal to 3% over the band.

17. A multi-layer optical filter arrangement according to claim 1 in which the difference between the percentage of light reflected from the first stack of the filter arrangement and the percentage of light reflected from the second stack of the filter arrangement when measured from the side opposite the reflecting side varies by less than or equal to 1% over the band.

18. A multi-layer optical filter arrangement according to claim 1 in which the percentage of light reflected from the first stack of the filter arrangement and the percentage of light reflected from the second stack of the filter arrangement when measured from the side opposite the reflecting side is less than or equal to 10% over substantially the entire band.

19. A multi-layer optical filter arrangement according to claim 1, wherein the substrate is a flexible substrate.

20. A multi-layer optical filter arrangement according to claim 19, wherein the substrate is a flexible film substrate comprised of a polymer selected from the group consisting of polyesters, PET, polycarbonate, acrylic, and cellulose triacetate.

21. A multi-layer optical filter arrangement according to claim 1, wherein the metal layers comprise at least one metal selected from the group consisting of chromium, nichrome, inconel, molybdenum, nickel, tungsten, rhodium, titanium, and vanadium.

22. A multi-layer optical filter arrangement according to claim 1, wherein the dielectric layers comprise at least one dielectric selected from the group consisting of silicon monoxide, titanium dioxide, tantalum pentoxide, yttrium oxide, neodymium oxide, niobium oxide, indium tin oxide, indium zinc oxide, zirconium oxide.

23. A method of manufacturing an optical filter arrangement on a roll of flexible film substrate that is at least two feet wide comprising:

(a) depositing a multi-layer thin film base stack on a surface of said substrate and over a substantial majority of its length using a web coater;

(b) printing a mask layer over a portion of said base stack using a wide format printer, said mask layer comprising a removable ink;

(c) depositing at least one additional thin film layer over said base stack and mask layer using the web coater; and

(d) removing said mask layer.

24. The method of claim 23, wherein said base stack comprises a first metallic thin film layer deposited on said substrate, a first dielectric thin film layer deposited on said first metallic layer, and a second metallic thin film layer deposited on said first dielectric layer.

25. The method of claim 23, wherein said additional thin film layer comprises a dielectric thin film layer.

26. The method of claim 23, wherein said wide format printer comprises a raster printer.

27. The method of claim 23, wherein step (b) further comprises connecting said printer to a microprocessor and utilizing said microprocessor to print said mask layer in the form of an image file stored within said microprocessor.

28. The method of claim 23, wherein said mask layer is removed using a solvent.

29. The method of claim 28, wherein said solvent is water.

30. The method of claim 28, wherein said solvent is an organic solvent.

31. The method of claim 28, wherein said solvent is isopropyl alcohol.

32. A method of manufacturing an optical filter arrangement on a roll of flexible film substrate that is at least two feet wide comprising:

(a) depositing a multi-layer thin film base stack on a surface of said substrate and over a substantial majority of its length using a web coater;

(b) storing said substrate for an indeterminate period of time;

(c) removing a section of said substrate as needed;

(d) printing a mask layer over said base stack on a portion of said section using a wide format printer, said mask layer comprising a removable ink;

(e) depositing at least one additional thin film layer over said base stack and mask layer of said section using the web coater; and

(f) removing said mask layer.

33. The method of claim 32, wherein said base stack comprises a first metallic thin film layer deposited on said substrate, a first dielectric thin film layer deposited on said first metallic layer, and a second metallic thin film layer deposited on said first dielectric layer.

34. The method of claim 32, wherein said additional thin film layer comprises a dielectric thin film layer.

35. The method of claim 32, wherein said wide format printer comprises a raster printer.

36. The method of claim 32, wherein step (b) further comprises connecting said printer to a microprocessor and utilizing said microprocessor to print said mask layer in the form of an image file stored within said microprocessor.

37. The method of claim 32, wherein said mask layer is removed using a solvent.

38. The method of claim 37, wherein said solvent is water.

39. The method of claim 37, wherein said solvent is an organic solvent.

40. The method of claim 37, wherein said solvent is isopropyl alcohol.